CAPACITOR OF SEMICONDUCTOR MEMORY DEVICE THAT HAS COMPOSITE Al_2O_3/HfO_2 DIELECTRIC LAYER AND METHOD OF MANUFACTURING THE SAME

BACKGROUND OF THE INVENTION

This application claims priority from Korean Patent Application No. 2002-69997, filed on November 12, 2002, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference. Also, this application is a Continuation-In-Part (C.I.P.) of application Ser. No. 10/452,979, filed on June 2, 2003.

1. Field of the Invention

The present invention relates generally to integrated circuits and a method of manufacturing the same, and more particularly, to a semiconductor device that has a dielectric structure capable of enhancing electrical characteristics, and a method of manufacturing the same.

2. Description of the Related Art

The increasing integration density of semiconductor devices needs a capacitor of a DRAM having greater capacitance per unit area. To meet this requirement, a variety of methods have been introduced. Such methods include a method of increasing the electrode surface area of the capacitor by forming a three-dimensional stacked, cylindrical, or trench type electrode or by forming hemispherical grains on the electrode surface, a method of thinning a dielectric layer, a method of forming the dielectric layer using of high-dielectric material having a high dielectric constant or a ferroelectric material and so on. However, the above methods are not without their limitations. For example, reducing the thickness of the dielectric layer seriously increases leakage current as the capacitance increases. When a material having a high dielectric constant, for example, Ta_2O_5 or BST($(Ba,Sr)TiO_3$), is used for the dielectric layer, polysilicon, which has been conventionally used to form the electrode, cannot be used. This is because the use of the polysilicon causes tunneling and increases leakage current when the thickness of the dielectric layer is reduced.

As another method for increasing capacitance per unit area of the capacitor, a metal-insulator-metal (MIM) capacitor whose electrode is formed of, instead of polysilicon, a metal having a large work function, such as TiN or Pt, has been suggested. In this method, the growth of a native oxide layer on the metal electrode is suppressed to prevent a capacitance